their shape. These being objects which he had not been accustomed even to feel, he was still learning them as a child learns to read: he could distinguish the angles, and could count their number in succession; but at the expiration of the third week, he could tell these forms nearly as readily as their colour.

The inferences which Mr. Home draws from these, are, that when the eye, before the cataract is removed, has only been capable of discerning light, without any power of distinguishing colours, then objects, after its removal, appear to touch the eye, and there is no knowledge of their outline, agreeably to the observations made by Mr. Cheselden. But when the eye has previously been able to distinguish colours, it has then also some knowledge of distances, though not of outline, but will soon attain this also, as happened in Mr. Ware's cases.

In a practical view, these cases confirm what has been laid down by Mr. Pott and by Mr. Ware, with regard to cataracts, in being generally soft, and in recommendation of couching as the operation which is best adapted for removing them.

Observations on the Structure of the different Cavities which constitute the Stomach of the Whale, compared with those of ruminating Animals, with a View to ascertain the Situation of the digestive Organ. By Everard Home, *Esq. F.R.S.* Read February 12, 1807. [*Phil. Trans.* 1807, *p.* 93.]

Mr. Home, having in a former paper communicated his observations upon the stomachs of ruminating animals, gives the present account of that organ in the whale tribe, to show that it forms a link in the gradation towards the stomach of truly carnivorous animals.

The *Delphinus delphis* of Linnæus, the bottle-nosed porpoise, called by Mr. Hunter the bottle-nosed whale, having been brought ashore alive by some fishermen at Worthing, Mr. Home took the opportunity of examining the structure of its stomach, and discovered a resemblance between the second, third, and fourth cavities in the whale, and the different parts of the fourth cavity in the camel and bullock, which appeared to throw some light upon their uses, as well as upon digestion in general.

The œsophagus in this porpoise is very wide: it has a number of longitudinal folds, and is lined with a strong cuticle, which is continued throughout the first stomach. This stomach lies in the direction of the œsophagus, without any contraction to mark its origin, and bears a strong resemblance in shape to a Florence flask. The coats of its cavity are firm, and are surrounded by a strong muscular covering.

The orifice leading to the second stomach is at right angles to the first, and at a small distance only from the œsophagus: the canal from thence into the second stomach is three inches long, and opens into it by a projecting orifice two inches and a half in diameter, at which the cuticular covering of the preceding parts terminates.

This stomach is nearly spherical, seven inches in diameter, of a honeycombed appearance and glandular structure. The exit towards the third stomach is placed very near the entrance from the first, and is only five eighths of an inch in diameter.

The third cavity is also spherical, and two inches in diameter, with an aperture only three eighths of an inch in diameter, leading to a fourth stomach. This cavity is nearly cylindrical, like an intestine, but rather widest, measuring nearly three inches at its further extremity, and fourteen inches and a half in length.

The pylorus, which is the boundary of this stomach, is only one fourth of an inch in diameter. The dilated cavity into which this opens has been considered by Cuvier and Hunter as belonging also to the stomach; but Mr. Home observes, that it should rather be considered as duodenum, since the common duct of the liver and pancreas opens into it.

The common porpoise, the grampus, and piked whale, have also four cavities constituting the stomach; but in the bottle-nosed whale of Dale there are as many as six: the general structure, however, is the same; and in all the whale tribe there is but one cavity lined with a cuticle, as in the camel and bullock. In all of them the second cavity has a very glandular structure, and in all the third is very small. The fourth stomach also, in each of them, has a smooth internal surface, with orifices of glands opening into its cavity.

The first stomach appears not to be a mere reservoir, since the food undergoes a considerable change in it. The flesh is here entirely separated from the bones, of which several handfuls were found without the smallest remains of the fish to which they belonged; the orifices into the second and third stomachs being too small to admit the bones to pass. The bones must consequently be reduced to a jelly in the first stomach, but require a longer time for the completion of that process than the fleshy parts.

The second cavity is that which Mr. Hunter supposed to be the true digesting stomach; but Mr. Home, notwithstanding his deference for every opinion of Mr. Hunter's, is of a contrary opinion, from considering that any further cavities would in that case be superfluous, after the complete formation of chyle, and from observing that the last cavity is that which, in its structure, bears the closest analogy to the simple human stomach, in which the process of forming chyle is certainly completed. From a comparison also of these stomachs with the fourth of the camel, it appeared that only the lower portion of that cavity is the stomach, in which the chyle is formed, and that its upper or plicated portion serves only to prepare the food for the process of digestion. In the same manner also in the bullock, although there is not the slightest contraction or subdivision between the upper and lower portions, Mr. Home considers the plicated part as a mere preparatory organ, and the lower as that which secretes the proper gastric juice.

As the stomachs of the camel, bullock, and horse, form principal links in the gradation from the most complex ruminating stomachs

to the most simple for digesting *vegetable* food, so those of the bullock, camel, and whale, are links from the ruminating to the most simple stomachs for digesting animal food; and the camel's stomach is the most important link in each series, the contraction peculiar to its fourth cavity making it intermediate between the bullock and the whale.

Although the above facts appear to throw some light on the digestion of different kinds of food, they also present difficulties which must remain to be explained when further progress has been made in the investigation. It is in general admitted, that animal substances do not require so long a process to convert them into chyle as vegetables; and hence the stomachs of carnivorous animals are in general most simple: but why the whale tribe, which live on fish that are very readily converted into chyle, should have a more complex stomach, it is not easy to explain. What further uses, in regard to other secretions, these preparatory stomachs may have, are foreign to the design of the present paper, which Mr. Home considers as a continuation of a series of observations on digestion, and hopes to extend further at some future opportunity.

On the Formation of the Bark of Trees. In a Letter from Thomas Andrew Knight, *Esq. F.R.S. to the Right Hon. Sir* Joseph Banks, *K.B. P.R.S. &c.* Read February 19, 1807. [*Phil. Trans.* 1807, *p.* 103.]

An extraordinary diversity of opinion having prevailed amongst naturalists most capable of correct observation, respecting the production and subsequent state of the bark of trees, Mr. Knight has undertaken to investigate the subject: but such are the difficulties of the subject, that, in a course of experiment which has occupied more than twenty years, he has scarcely felt himself prepared, till the present time, even to give an opinion of the manner in which the cortical substance is either generated in the ordinary course of its growth, or re-produced when that which previously existed has been taken off.

Du Hamel had shown, that the bark of some species of trees is readily re-produced when the decorticated alburnum is secluded from the air. Mr. Knight has repeated these experiments on the apple, the sycamore, and some other trees, with the same result; and has also observed, that the wych-elm, in moist and shady situations, will frequently re-produce its bark when no covering whatever has been applied.

A glairy fluid (as Du Hamel justly observes) exudes from the surface of the alburnum, which appears to change into a pulpous organized mass, and subsequently becomes organized and cellular,—facts which are extremely favourable to the opinion of Hales, that the bark is derived from the substance of the alburnum. But other facts may be adduced which lead to a contrary conclusion; since the internal surface of pieces of bark, when detached from contact with the alburnum, but remaining united to the tree at their upper